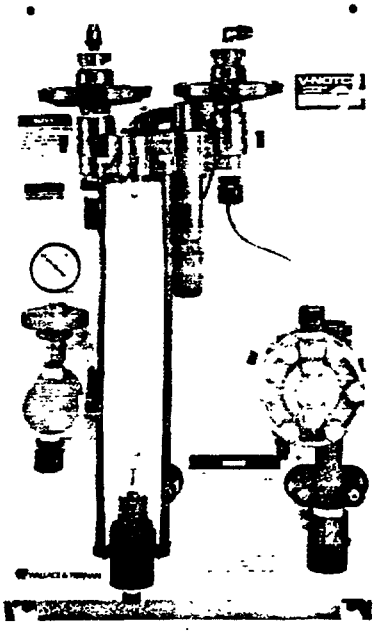
APPENDIX E

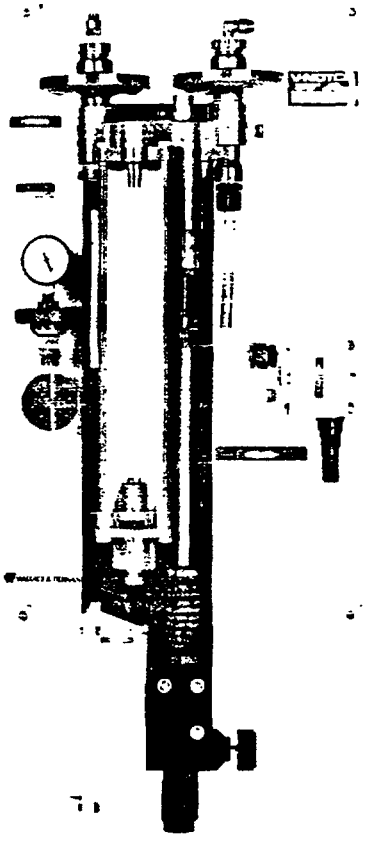
Chlorination System and Flowmeter Design Information

WALLACE & TIERNAN®

SERIES V-75
V-NOTCH CHLORINATOR



Manual Control



Automatic Control

FEATURES

- Versatile wall-mounted chlorinator operates in five control modes, manual to fully automatic.
- Wall mounted to eliminate handling of the plastic-and-glass gas-metering components when changing cylinders.
- Automatic switchover built in.
- Components easily accessible for service.
- Readable 10-inch-scale rotameters in 13 capacities, widest choice in the industry.
- Can be upgraded from manual to automatic control in the field via a retrofit kit.
- Maximum capacities of 200 or 500 lb of chlorine per 24 hours.
- Also available for feeding sulfur dioxide or carbon dioxide.
- Backed by factory-trained and authorized service personnel nationwide.

APPLICATIONS

FOR MUNICIPAL OR INDUSTRIAL WATER TREATMENT

Disinfection of potable water in small treatment plants or in-plant systems; disinfection of boiler make-up water; intermittent or continuous treatment of cooling water to inhibit slime in piping, heat exchangers, and cooling towers; slime and algae control in irrigation systems; as a standby unit for large treatment plants.

FOR MUNICIPAL OR INDUSTRIAL WASTE TREATMENT

For small wastewater-treatment plants or for lift stations in large plants; treatment of domestic and municipal sewage; disinfection of municipal wastewater; treatment of cyanide and other wastes from metal-finishing processes; pulp and paper industry wastes; fluming, can-cooling, wash-down and other recirculated or discharged water in the food canning, food freezing, brewing, and bottling industries; chemical and petrochemical plant wastes.

FOR INDUSTRIAL-PROCESS WATER

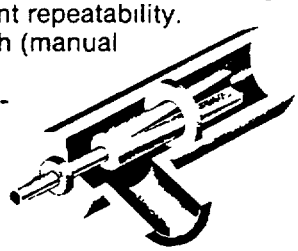
Taste and odor control in soft-drink-bottling plants and breweries; disinfection of process water and bleaching of raw materials in pulp and paper mills; tempering-water treatment and bleaching in flour mills; bleaching in textile mills; high-purity water in the electronics, pharmaceutical, and cosmetics industries.

Note: Do not use this equipment for swimming pool, water park, or similar recreational applications. It is not sold for such use.

FEATURES

V-NOTCH GIVES SUPERIOR GAS-FLOW CONTROL

The V-notch orifice consists of a precisely grooved plug sliding in a fitted ring. Any position of the plug in the ring results in a specific orifice size and corresponding feedrate. This means accurate gas-flow control and excellent repeatability.



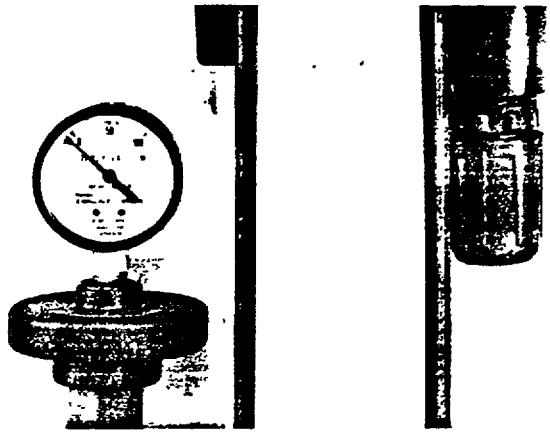
The plug moves one inch (manual control) or three inches (automatic control) compared to a fraction of an inch for control valves. This provides ease of feed-rate adjustment. The V-notch resists sticking and corrosion: it's made of chemical-resistant, self-lubricating plastic. The size and design of the orifice resists clogging from contaminants in the gas supply.

ALL-VACUUM OPERATION

A vacuum-regulating valve at the gas supply reduces gas pressure to a vacuum at once. Dry gas moves through the system to the injector under vacuum. There are no components carrying gas under pressure. A vacuum loss causes the valve to shut off the gas supply.

EASY READABILITY AND SERVICING

Feed rate responds to an adjustment knob and is easy to read on the large, 10-inch-scale rotameter. A vacuum gauge warns of high vacuum, an indication of interrupted or exhausted chlorine supply. The panel containing gas-flow components is designed so that there is adequate room around each component. Components are easily taken apart and serviced on the panel. The automatic-controller panel features large digits, prominent alarm lights, and tri-color bar graphs.



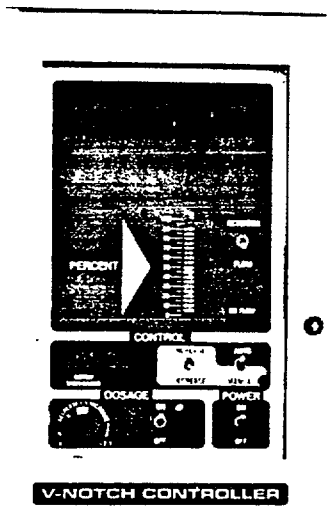
FIVE CONTROL MODES, QUICK FIELD CONVERSION

The wall-mounted V-75 Chlorinator offers manual, start-stop or program, flow-proportional, direct-residual, and compound-loop control. Manual chlorinators can be upgraded to automatic control in the field at any time via a retrofit kit.

AUTOMATIC CONTROLLER

Flow-proportional Control

For this type of control, the V-75 Chlorinator has an electronic controller and a V-notch Actuator. The controller is compact, rated NEMA 12. Its front panel has user-friendly operator controls; an LED bar graph which displays flow input or chlorinator feedrate in percent; a no-flow alarm; a dosage-control adjustment (20-200%), and an electronic manual override. The controller can be wall- or panel-mounted.



Flow Proportional Controller

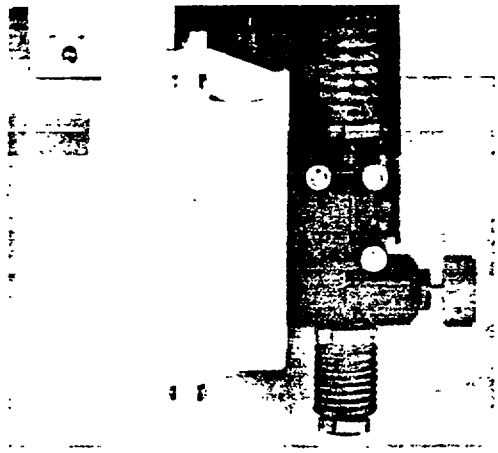
Residual and Residual-flow Control

For these control modes, the V-75 Chlorinator has a V-notch Controller and a V-notch Actuator. The controller operates in three modes: flow-proportional, direct-residual, and compound-loop. Thus an installation can be upgraded to compound-loop control anytime without the purchase of additional hardware. The controller's front panel has user-friendly controls including: an LED readout of the measured residual or residual set-point; high- and low-residual alarms; an LED bar graph which displays residual deviation from the setpoint and which flashes a residual-deviation alarm. Also included are an electronic-manual over-ride with feedrate indication, a dosage adjustment (for flow-proportional control only) which scales the incoming flow signal from 20 to 200%, and a bar graph which indicates percent V-notch position (chlorine feedrate) or the value of the flow-input signal.

For both controllers, calibration LED's make adjustments easy, minimize the need for external calibration equipment.

Actuator

The actuator, rated NEMA 4X, positions the V-notch orifice (gas-flow-control device) via a mechanical linkage. It contains an AC reversible motor with thermal-overload protection, a mechanical-manual override with feedrate (V-notch position) shown on the bar graph, limit switches, and an optional retransmitting potentiometer for remote indication of feedrate. A feedback potentiometer provides a closed-loop control circuit between the actuator and the controller.



NEMA 4X Actuator for automatic positioning of the V-notch plug. The manual override knob shown disengages the actuator and provides manual feedrate adjustment.

ARRANGEMENTS

Standby

The V-75 Chlorinator is inexpensive and easy to install. It makes an excellent back-up unit to help avoid interruption of treatment or to help with unusually high demands.

Automatic Switchover

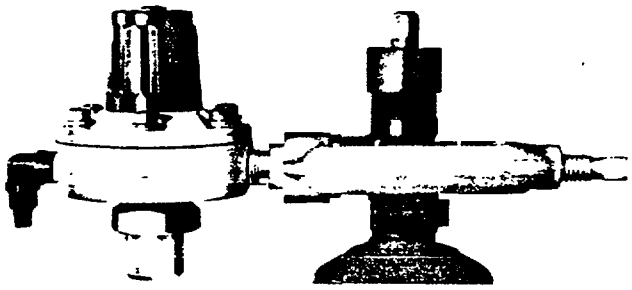
Any V-75 Chlorinator is available with automatic switchover to a fresh supply of gas when the on-line supply runs out (see details on page 3).

Other Gases

As well as maximum capacities of 200 and 500 lb of chlorine gas per 24 hours, the V-75 is also available for feeding sulfur dioxide with maximum capacities of 200 and 475 lb per 24 hours and carbon dioxide with maximum capacities of 156 and 390 lb per 24 hours.

AUTOMATIC SWITCHOVER BUILT-IN

Without the use of a separate device, a pair of optional vacuum-regulating valves gives automatic switchover to a fresh supply when the on-line supply runs out. Although the new supply goes on line, gas will be withdrawn from the former supply until the container is empty. This helps avoid returning usable gas to the supplier in the "empty" container.



200 PPD vacuum-regulator

WALL-MOUNTED

Unlike cylinder-mounted chlorinators, the wall-mounted Series V-75 is designed for the operator's convenience. It's separate from the vacuum-regulating valve so that it and the pressure relief line are not handled every time gas containers are changed.

EASY INSTALLATION

A simple, self-aligning yoke mounts the vacuum-regulating valve on a cylinder or header valve, or with an adapter, on a ton-container valve. The gas-flow components, injector, and V-notch actuator are on a separate panel for wall mounting. This arrangement saves space and makes it easy to locate the controls away from the gas supply. With all-vacuum operation, inexpensive plastic tubing can be used instead of copper tubing or steel pipe.

Vacuum regulator with ton-container adapter

ECONOMICAL CHLORINATION

The V-75 Chlorinator is the workhorse of the V-notch line. With its straightforward, time-proven design, it has little that can go wrong. Corrosion-resistant materials, easy maintenance, and low initial price make it ideal for any type of application requiring up to 500 pounds of chlorine per day. As control requirements change, this chlorinator can be upgraded to automatic control by means of a retrofit kit.

DESIGN AND CONSTRUCTION

GAS-METERING SYSTEM

The Wallace & Tiernan V-75 Chlorinator features chemical-resistant-plastic construction. The vacuum-regulating valve is made of rugged plastics and metal to withstand full supply pressure and rough handling. It can be taken apart, cleaned, and replaced without disturbing adjustments. An optional trap-and-filter unit protects gas-metering components from contaminants in the gas.

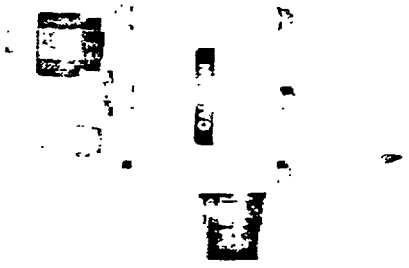
These components and the injector are on a chemical-resistant panel for wall mounting. Valves for differential-vacuum regulation and pressure relief are separate; they have sealed-diaphragm units which are easy to remove and replace. The spring-mounted rotameter snaps in and out easily.

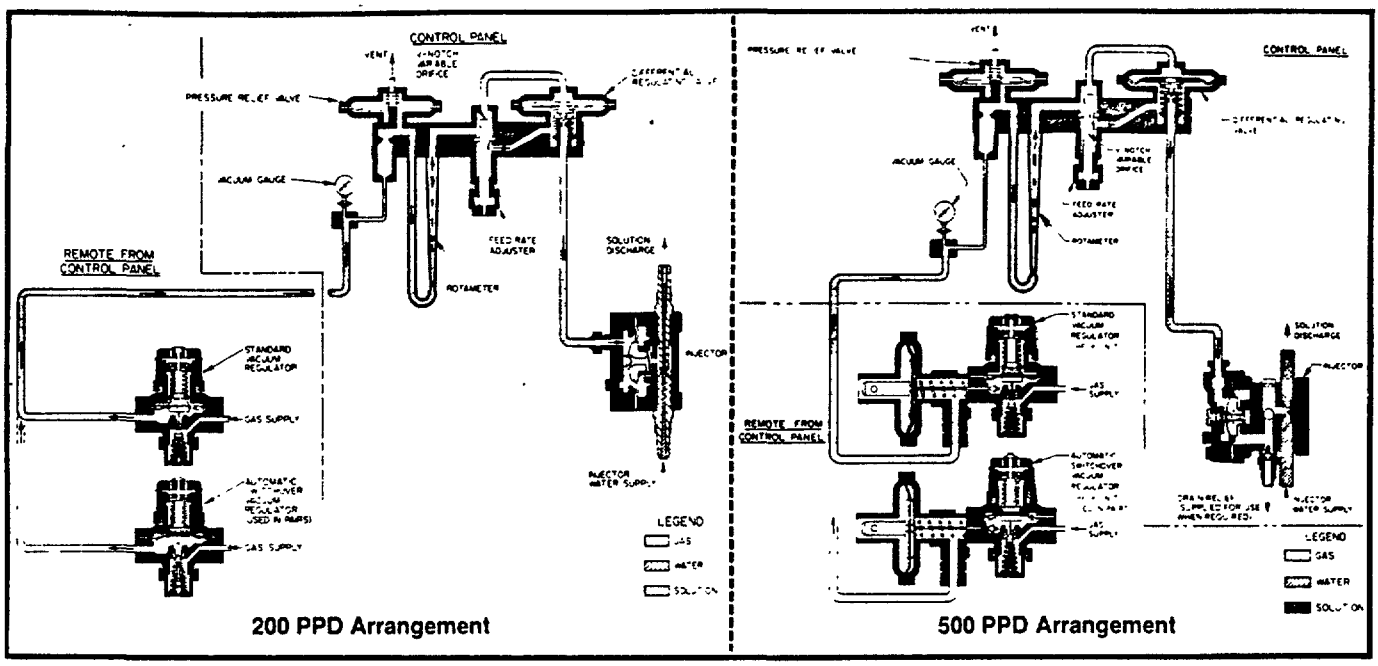
The vacuum-regulating valve allows manual gas shut-off, permits changing containers without admitting air, dirt, or moisture and without shutting off the injector. The valve is factory-adjusted to reduce container pressure to optimum operating vacuum. The 500 PPD vacuum-regulating valve also has a secondary check valve.

A pair of optional vacuum-regulating valves achieves automatic switchover. The valve on standby is held closed by a detent. When the on-line supply is exhausted, system vacuum increases, overcoming the latching force of the detent. The standby supply comes on line—along with the original supply. Feeding from both containers virtually assures completely empty containers.

INJECTORS

The fixed-throat, differential-type injectors create a powerful operating vacuum. Should operating vacuum stop, a spring closes the diaphragm-check in the 200-lb-per day injector. Any backpressure will provide additional sealing force. A poppet valve gives back-up protection against flooding the gas-control components. The 500-lb injector has a similar diaphragm-check valve backed by a ball check. For superior backflood protection, a drain relief (supplied with the injector) is easily added at the user's option. Injector materials resist corrosion and erosion.





200 PPD Arrangement

500 PPD Arrangement

OPERATION

The V-75 Chlorinator operates under vacuum produced in the differential-type injector and transmitted to the vacuum-regulating valve by plastic pipe or tubing.

Gas enters the vacuum-regulating valve. Here a diaphragm senses vacuum on one side and atmospheric pressure on the other. Force on the diaphragm displaces a spring-loaded valve stem off a seat. This permits gas to move toward the flow-control components and helps to maintain the proper operating vacuum ahead of these components.

Still under vacuum, gas moves through a vacuum gauge and enters a pressure-relief valve. This valve will vent to atmosphere if a malfunction occurs and pressure builds, even slightly. Gas next passes through the rotameter where its flow rate is measured and the V-notch orifice where its flow rate is controlled by either manual or automatic positioning of the V-grooved plug in its ring.

Gas next passes to a differential-regulating valve. This diaphragm valve maintains the proper vacuum differential across the V-notch orifice.

At the injector, metered gas is dissolved in the water stream. The resultant solution is discharged at the point of application.

METHODS OF CONTROL

The feed rate of any V-75 Chlorinator is controlled by one or both of the following: interrupting the injector-water supply to shut off the chlorinator's operating vacuum; changing V-notch-orifice area while holding vacuum differential across the orifice constant.

Manual Control

Achieved by changing V-notch-orifice area by means of an adjustment knob on the front of the chlorinator.

Start-stop or Program Control

This type of control is easily implemented: The V-75 Chlorinator's operating vacuum is started and stopped by interrupting the injector water supply. An optional, 2-way solenoid valve in the injector-water line is wired into the control circuit of a pump, switch, timer, or controller.

Flow-proportional Control

The V-75 Chlorinator's controller accepts a variety of flow-proportional inputs from a primary flowmeter or flowmeter transmitter.Via the V-notch actuator, the controller converts the input to a V-notch position, thus a chlorine feedrate proportional to flow.

METHODS OF CONTROL

Direct-residual Control
This type of Wallace & Tiernan Control System maintains a desired residual where flow is constant or changes only gradually as in distribution systems, cooling-water circuits. The V-75 Chlorinator's controller accepts a 4-20 mA input proportional to residual from a W&T DEPOLOX™3 Residual Analyzer. This input is compared with a setpoint and chlorinator feedrate is increased or decreased accordingly.

Compound-loop Control
This closed-loop, information-feedback, dual-signal system gives automatic control of any Wallace & Tiernan V-75 Chlorinator according to the water's flow rate and residual requirement. It is ideal where flow varies rapidly and over a wide range. The chlorinator's controller accepts a flow-proportional input signal in addition to the 4-20 mA residual signal generated by a W&T DEPOLOX 3 Residual Analyzer. The controller integrates these two signals and establishes the required chlorinator feedrate by adjusting V-notch-orifice area via the V-notch actuator.

TECHNICAL DATA

accuracy
Gas feed is 4% of the indicated flow.

gases and capacities

MAXIMUM CAPACITIES	CHLORINE lb/24 hours	CARBON DIOXIDE lb/24 hours	SULFUR DIOXIDE lb/24 hours
V-75 VA2 CONTROL UNIT to 200 lb/day chlorine	3/ 10/ 20/ 30 50/ 75/ 100 150/ 200	2.3/ 7.5/ 15 23/ 35/ 55/ 75 116/ 156	3/ 10/20/ 30 50/75/ 100 150/200
V-75 VA5 CONTROL UNIT to 500 lb/day chlorine	3/ 10/ 20/ 30 50/ 75/ 100 150/200/250 300/400/500	2.3/ 7.5/ 15 23/ 35/ 55/ 75 116/156/200 230/300/390	3/ 10/ 20/ 30 50/ 75/ 100 150/200/250 300/400/475

operating range
Manual, 20:1 for any rotameter; automatic, 10:1.

control modes
Manual, start-stop or program, flow-proportional, direct-residual, and compound-loop control. (See page 5.)

distance, supply to control panel
For flexibility, it is not necessary to install the vacuum-regulating valve close to the control panel. They can be a few feet to several hundred feet apart, depending on maximum feedrate and the diameter of connecting pipe or tubing.

injector-operating water
Must be reasonably clean. Injectors are fixed-throat, differential types. Maximum inlet pressure is 300 psi to 100 F; 150 psi to a maximum of 130 F.

pressure at application point
Maximum pressure with hose or polyethylene tubing is 75 psi, but high pressure hose or rigid pipe will allow application against backpressure of 75 to 160 psi. A solution pump after the injector will allow application against higher pressure.

connections
Pipe and plastic tubing sizes given in inches.

VACUUM-REGULATING VALVES

tubing to	200 lb	500 lb
control panel	3/8 x 1/2	1/2 x 5/8
container valve	gas inlet is a yoke connection to a cylinder or header valve, or with optional adapter, to a ton-container valve.	

CONTROL PANEL

tubing to	200 lb	500 lb
vent	1/4 x 3/8	1/4 x 3/8

INJECTORS

connection	200 lb	500 lb
water inlet	3/4 male NPT or 3/4 flexible pipe	1 female NPT
water outlet	same as inlet	3/4 NPT with adapters for 3/4, 1, or 1 1/2 pipe or hose
drain relief (if used)	—	1/4 x 3/8

electrical requirements
Controller requires 120 volts ± 10% (0.3 amps) or 240 volts ± 10% (0.15 amps), 50/60 Hz, single phase. 115 volts, 50/60 Hz, 15 watts for heater used with ton-container connection. There may be other requirements: solenoid valves for start-stop operation; solution or booster pumps.

AUTOMATIC CONTROL

dosage
Flow-input signal is scaled from 20 to 200%.

inputs
Flow-proportional inputs are 4-20, 0-16, or 0-20 mA or 0.2-1, 0-1, 1-5, or 0-5 volts dc. Input from the residual analyzer is 4-20 mA dc.

output
Optional, unpowered retransmitting potentiometer for remote indication of chlorinator feedrate (V-notch position).

FLOW RANGE & ACCURACY SELECTION CHART

METER SIZE	ACCURACY ±2% *LOW VELOCITY CONSTRUCTION FLOW RATE GPM MIN. - MAX.	ACCURACY ±2% STANDARD CONSTRUCTION FLOW RATE GPM MIN. - MAX. - INT.	ACCURACY ±2% HIGH VELOCITY CONSTRUCTION FLOW RATE GPM MIN. - MAX.	STANDARD CONSTRUCTION HEAD LOSS @ MAX FLOW INCH	PSI
2	35 - 120	40 - 160 - 225	N/A	49	1.77
3	40 - 250	45 - 250 - 350	N/A	25	.90
4	50 - 500	55 - 500 - 700	200 - 700	22	.79
6	90 - 1200	120 - 1200 - 1500	300 - 1500	18	.65
8	100 - 1500	150 - 1500 - 2000	400 - 2500	4.0	.15
10	125 - 2000	180 - 2000 - 3000	500 - 3500	3.0	.11
12	150 - 2800	200 - 3000 - 3500	800 - 5000	3.0	.11
14	250 - 3750	300 - 4000 - 4500	1000 - 6000	2.2	.08
16	350 - 4750	400 - 5000 - 6000	1200 - 7500	1.9	.07
18	450 - 5625	700 - 6000 - 7500	1500 - 9000	1.9	.07
20	550 - 6875	850 - 8000 - 9000	2000 - 12,000	1.4	.05
24	800 - 10,000	1000 - 10,000 - 13,500	3000 - 15,000	.83	.03
30	1200 - 15,000	1800 - 15,000 - 21,000	4000 - 25,000	.5	.018
36	1500- 20,000	2000 - 20,000 - 30,000	5000 - 35,000	.5	.018
42	2000 - 28,000	3000 - 30,000 - 40,000	6000 - 50,000	.5	.018
48	2500 - 35,000	5500 - 35,000 - 50,000	7000 - 60,000	.5	.018
54	3200 - 45,000	6500 - 45,000 - 55,000	8000 - 65,000	.4	.014
60	4000 - 60,000	7500 - 60,000 - 80,000	10,000 - 90,000	.4	.014
66	4750 - 75,000	8500 - 75,000 - 95,000	12,000 - 105,000	.4	.014
72	5500 - 90,000	9500 - 90,000 - 115,000	15,000 - 125,000	.3	.014
84	**	** - 125,000 - 150,000	**	.3	.011
96	**	** - 160,000 - 200,000	**	.3	.011
108	**	** - 200,000 - 250,000	**	.3	.011
120	**	** - 250,000 - 300,000	**	.3	.011

Standard construction will be supplied for all main line meters unless special flow range, materials, or construction are required. Refer to individual data sheets for flow range of each model.

* Low velocity (LV) construction has the same low and maximum flow rates as AWWA C704. Low velocity meter sizes 2" thru 48" are only available as main line tube type. Sizes 54" thru 120" are available on all other main line meters. For lower flows refer to Model TM-01 turbine meters on page 9.

** Consult factory for flow range or special construction.

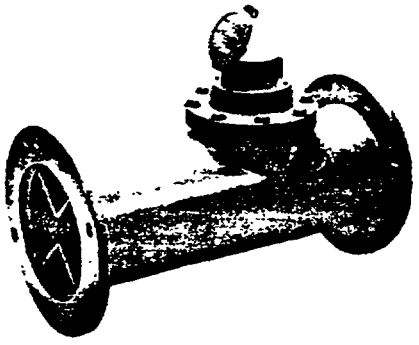
The meter must have a full flow of liquid for proper accuracy. Valves, fittings or other obstructions that tend to set up flow disturbances, should be a minimum of five pipe diameters upstream and one pipe diameter downstream from the meter. Meters not equipped with straightening vanes must have a minimum of ten pipe diameters upstream and two pipe diameters downstream from the meter.

MAIN LINE METERS

MODEL ML-03 AND ML-04 (150 PSI)

MODEL ML-07 AND ML-08 (300 PSI)

3"- 48" STEEL FLANGED TUBE METER



Model ML-03-5G and ML-04-5G, 5 Year Guarantee Meters are available. Consult factory for price.

ML-03 and ML-07 meters are equipped with standard totalizers. ML-04 and ML-08 meters are equipped with indicator-totalizers. Installation is made by bolting meter tube to flanges of adjoining pipe.

MODEL ML-11 AND ML-12 (150 PSI)

MODEL ML-15 AND ML-16 (300 PSI)

3"- 48" STEEL PLAIN END TUBE METER

ML-11 and ML-15 meters are equipped with standard totalizers. ML-12 and ML-16 meters are equipped with indicator-totalizers. Installation is made by using one of the many types of pipe couplings available or by welding to adjoining pipe. Grooved end tubes are optional.

MODEL ML-19 AND [illegible] (150 PSI)

MODEL ML-21 AND ML-22 (300 PSI)

4"- 72" STEEL WELDING SADDLE METER

ML-19 and ML-21 meters are equipped with standard totalizers. ML-20 and ML-22 meters are equipped with indicator-totalizers. Installation is made by cutting a hole in existing pipe and then welding the saddle to the line. The removable meter head assembly can then be bolted to the saddle.

MODEL ML-T1 AND ML-I1 (150 PSI)

3"- 72" METER HEAD ASSEMBLY

MODEL ML-T1X AND ML-I1X (150 PSI)

6"- 72" REPLACEMENT METER HEAD ASSEMBLY

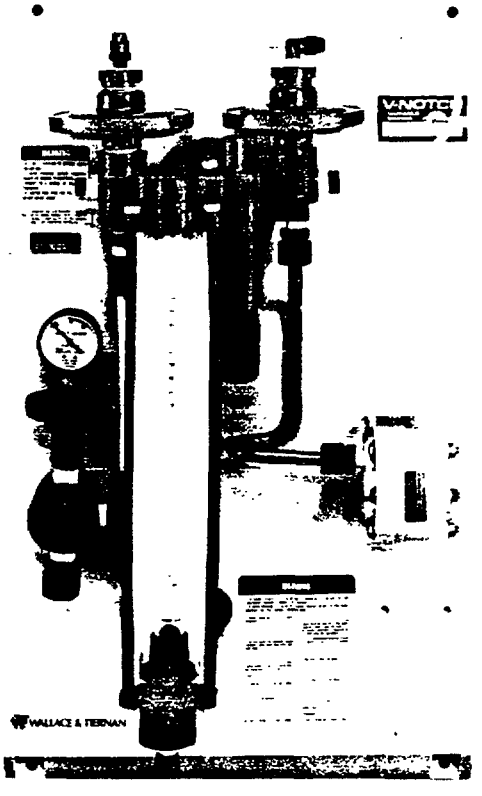
ML-T1 and ML-T1X meters are equipped with standard totalizers. ML-I1 and ML-I1X meters are equipped with indicator-totalizers. ML-T1 and ML-I1 meters bolt into existing Water Specialties saddles or meter tubes. ML-T1X and ML-I1X meters bolt into other manufacturers existing saddles and meter tubes, sizes 6"- 72".

alarm contacts
No-flow alarm, one N.C. and one N.O.; residual alarm, common for high and low alarm: one N.C. and one N.O.; deviation alarm, activates at 15%, 30%, or 50% deviation from setpoint: one N.C. and one N.O. These three alarms are rated 3 amps at 120 VAC or 28 VDC.

mounting
Controller is remote mounted on a wall or control panel. Maximum distance from the chlorinator is 500 feet with 20-gauge wire, farther with heavier wire.

INSTALLATION PACKAGES

Package V-75VA2 *(3 to 200 lb chlorine per day) contains:* Control panel with injector; rotameter for one capacity; operating-vacuum gauge; 25' of ⅜" x ½" polyethylene tubing (vacuum-regulating valve to control panel); 25' of ¾" flexible polyethylene pipe (for injector outlet); ammonia solution; lubricant; clamps; vent screen; instruction book.



Series V75 200 PPD arrangement

Package V-75VA5 *(3 to 500 lb chlorine per day) contains:* Control panel with injector; rotameter for one capacity; operating-vacuum gauge; 25' of ¼" x ⅜" polyethylene tubing (for vent line and drain relief line); 25' of ½" x ⅝" polyethylene tubing (vacuum-regulating valve to control panel); ammonia solution; lubricant; vent screen; instruction book.

Package 200B *(for capacities to 200 lb per day) contains:* One vacuum-regulating valve; 10' of ¼" x ⅜" polyethylene tubing for vent line; lead gaskets.

Package 200C *(for capacities to 200 lb per day) contains:* 2 vacuum-regulating valves for automatic switchover; 20' of ¼" x ⅜" polyethylene tubing for vent line; lead gaskets.

Package 500B *(for capacities to 500 lb per day) contains:* One vacuum-regulating valve; 6' of ½" x ⅝" polyethylene tubing (vacuum-regulating valve to control panel); lead gaskets.

Package 500C *(for capacities to 500 lb per day) contains:* 2 vacuum-regulating valves for automatic switchover; 12' of ½" x ⅝" polyethylene tubing (vacuum-regulating valves to control panel) with tee and tubing connectors; lead gaskets.

Package V-75EF *(for flow-proportional control) contains:* Electronic V-notch controller with wall mounting brackets; V-notch actuator with bracket for mounting on V-75 panel; 6 ft. of ½" conduit.

Package V-75EC *(for direct-residual or compound-loop control) contains:* Electronic V-notch controller with wall mounting brackets; V-notch actuator with bracket for mounting on V-75 panel; 6 ft. of ½" conduit.

Note: Not included in any of the above packages but necessary to complete an installation is rigid pipe or hose for injector inlet.

options
Trap-and-filter Unit, has removable filter, is designed to strain contaminants out of the gas.

Ton-container Kit, adapts the 200-lb or 500-lb vacuum-regulating valve for mounting on a ton container. It has a drip leg to trap initial spurts of liquid and a heater to evaporate them.

Related options include: cylinder and ton-container valves and connections; header valves with manifolding and connections; vent, injector-water, and injector-outlet lines and clamps; main connections; solenoid valves; water-line pressure gauge; high-low vacuum switch and alarm; gas masks; on-line residual analyzers; residual test kits; injector-vacuum gauge; spare parts; booster pumps; chlorine detector; W&T Two-cylinder Scales with digital or analog readout; pair of cylinder valves for automatic switchover.

Chlorine-gas warning: All unattended chlorine containers and chlorination equipment should be monitored for leaks. Sensitive chlorine detectors, which will respond quickly to chlorine in the atmosphere, should be installed at each site. Write for Wallace & Tiernan Technical Data Sheet 50.135.

THE STATE OF THE ART PROPELLER METER

WATER SPECIALTIES propeller meters are designed and manufactured utilizing the most precise techniques and superior materials to give, you the customer, the highest quality propeller meter available. Materials used on all meters and flow ranges for the low velocity meter meet or exceed AWWA standard C704. Meter are available for a variety of applications, in sizes 2" through 120" with working pressure up to 3000 PSI. Don't accept any less - insist on Water Specialties low maintenance, long life design.

CHANGE GEARS are utilized allowing dial changes or recalibration for different pipe sizes to be done in the field, without removing pressure from the line.

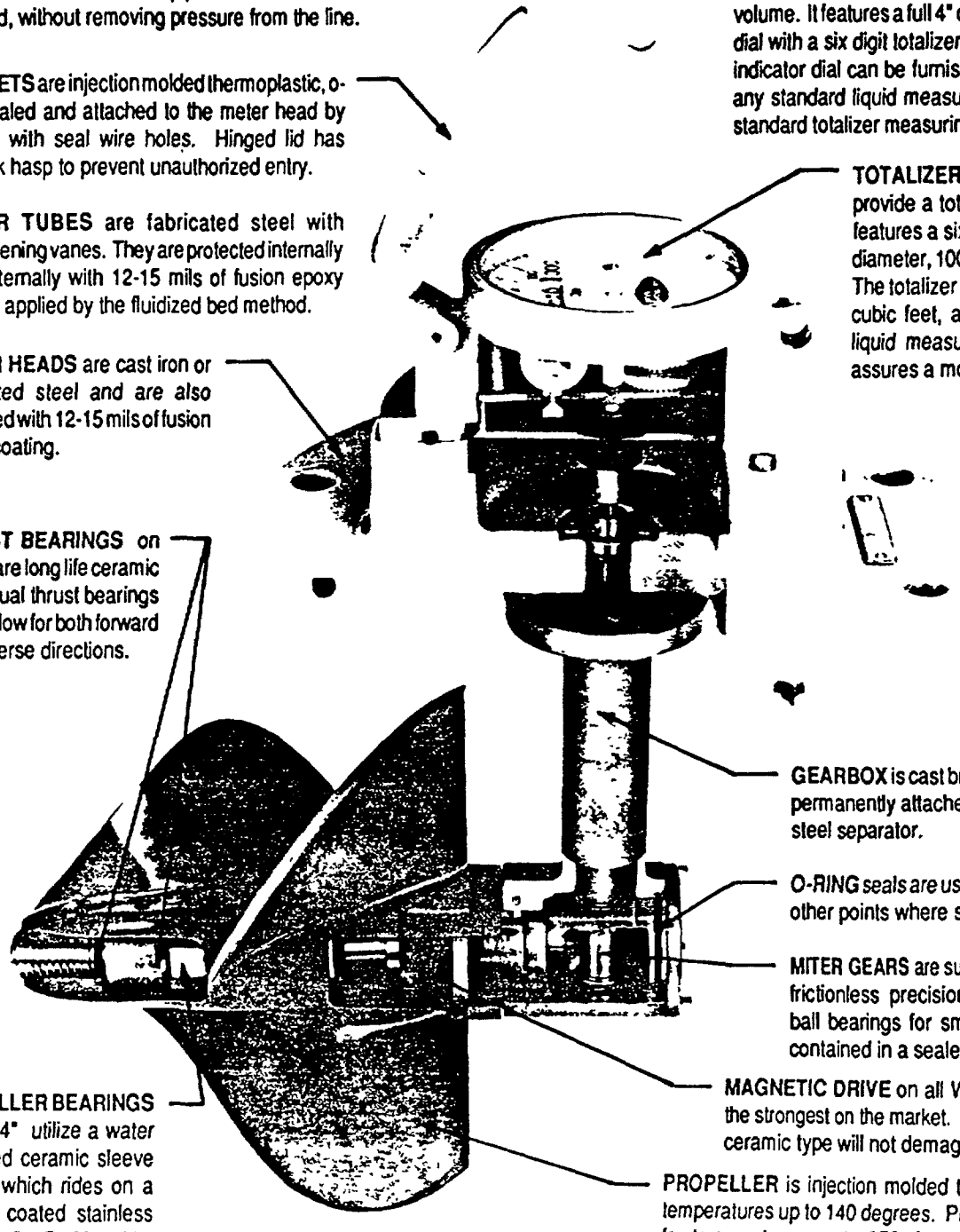
BONNETS are injection molded thermoplastic, o-ring sealed and attached to the meter head by screws with seal wire holes. Hinged lid has padlock hasp to prevent unauthorized entry.

METER TUBES are fabricated steel with straightening vanes. They are protected internally and externally with 12-15 mils of fusion epoxy coating applied by the fluidized bed method.

METER HEADS are cast iron or fabricated steel and are also protected with 12-15 mils of fusion epoxy coating.

THRUST BEARINGS on 2"-54" are long life ceramic type. Dual thrust bearings handle flow for both forward and reverse directions.

PROPELLER BEARINGS on 2"- 54" utilize a water lubricated ceramic sleeve bearing which rides on a ceramic coated stainless steel spindle. On 60"- 120", sealed stainless steel dual ball bearings are used.



INDICATOR-TOTALIZER is optional to provide an instantaneous flow rate indication and a totalization of flow volume. It features a full 4" diameter, 250 degree sweep dial with a six digit totalizer and test sweep hand. The indicator dial can be furnished in GPM, CFS, MGD or any standard liquid measuring units, with a choice of standard totalizer measuring units.

TOTALIZER is standard on all meters to provide a totalization of flow volume. It features a six digit totalizer with a full 3" diameter, 100 division, center sweep dial. The totalizer can be furnished in gallons, cubic feet, acre feet, or any standard liquid measuring unit. Magnetic drive assures a moisture tight seal.

GEARBOX is cast bronze with propeller spindle permanently attached into removable stainless steel separator.

O-RING seals are used at the meter head and all other points where seals are required.

MITER GEARS are suspended between essentially frictionless precision shielded stainless steel ball bearings for smoother operation and are contained in a sealed oil filled gearbox.

MAGNETIC DRIVE on all Water Specialties meters is the strongest on the market. Four pole radial, permanent ceramic type will not demagnetize or rust.

PROPELLER is injection molded thermoplastic and handles temperatures up to 140 degrees. Propellers are also available for temperatures up to 350 degrees. Neither propeller will change pitch even at the highest velocities or through their specified temperature range.

TECHNICAL DATA

Carbon dioxide warning: Because of the high pressure in carbon dioxide containers, the vacuum-regulating valve cannot be mounted directly on the cylinder. A pressure-reducing valve must be between the supply and the vacuum-regulating valve.

compliance
Chlorinator, controller, and actuator are designed to conform to all applicable NEC and NEMA specifications and Chlorine Institute and Compressed Gas Association recommendations.

overall dimensions
Chlorinator, 40" H, 17" W, 8¾" D; controller, 13" H, 7" W, 5" D.

shipping weights
Packages: V-75EF, 85lb; V-75EC, 85 lb; V-75 VA2, 45 lb; V-75 VA5, 50 lb; 200B, 20 lb; 200C, 30 lb; 500B, 25 lb; 500C, 35 lb.

SHORT DESCRIPTION

The chlorinator is a Wallace & Tiernan Series V-75 Chlorinator. It is an all-vacuum-operated type in a model for manual control or for automatic control. It consists of a vacuum-regulating valve at the gas supply, a wall-mounted unit containing the injector and gas-flow-control components, and a separate electronic controller. The gas-control components are arranged to facilitate servicing. There are 13 rotameters with maximum capacities to 200 lb or 500 lb of chlorine, 200 lb or 475 lb of sulfur dioxide, 156 lb or 390 lb of carbon dioxide per 24 hours. The rotameters have 10-inch scales. Maximum back-pressure is 160 psi; operating range is 20:1 for manual and 10:1 for automatic. The gas-regulating device is a V-notch variable orifice. The V-notch will maintain set feed rate within 4% of indicated flow.

The container-mounted vacuum-regulating valve has a pressure-reducing and shut-off valve with manual gas shut-off. It is yoke-mounted on a cylinder or header valve, or with adapter, on a ton-container valve. The wall-mounted unit has a rotameter, differential-regulating and pressure-relief valves, an operating-vacuum gauge, a differential-type, fixed-throat injector, and the V-notch variable orifice. The 200-pound injector has a diaphragm check valve backed by a poppet valve. The 500-pound injector has a diaphragm-check valve, ball check, and a drain relief for use when required. A dedicated controller, rated NEMA 12, has user-friendly controls, including high-resolution readouts, easily changed operating parameters, alarms, and simple calibration procedures.

Optional vacuum-regulating valves switch over to a fresh gas supply when the on-line supply runs out. An optional trap-and-filter unit protects metering components from impurities in the gas.

Chlorinator control can be manual; start-stop or program; flow-proportional. Also available are direct-residual control via an electric signal from a residual-chlorine analyzer and compound-loop control in which chlorinator feedrate is controlled by a similar signal from an on-line analyzer and one from a flowmeter.

AFTER-SALE SUPPORT

To keep your equipment operating at top efficiency, Wallace & Tiernan offers the most inclusive after-sale support in the industry.

replacement parts
Genuine Wallace & Tiernan replacement parts not only protect your investment in W&T equipment, they also offer assurance against failure in critical public-health-related applications. Avoid the hazard and hidden costs of cheap imitations. Wallace & Tiernan offers fast delivery of original-quality replacement parts from a large parts inventory or from stocking distributors nationwide. Use of such parts helps maintain equipment in good working order ... eliminate equipment breakdowns and costly downtime.

preventive-maintenance kits
These kits contain original Wallace & Tiernan replacements for those parts most susceptible to wear and/or most often replaced. They facilitate scheduled maintenance and emergency repairs.

preventive-maintenance contracts
To help keep this equipment running like new with minimum downtime and at a reasonable cost, Wallace & Tiernan offers two preventive-maintenance plans: One includes periodic visits for inspection, cleaning, calibration, adjustment, and lubrication followed by a written report. A second plan includes the above plus parts installation. Demand-repair service is also available. Service work is done by factory-trained personnel from our nationwide chain of direct-factory-service representatives, service organizations, and contractors.

WALLACE & TIERNAN®
WALLACE & TIERNAN, INC.
25 MAIN ST., BELLEVILLE, N.J. 07109-3057

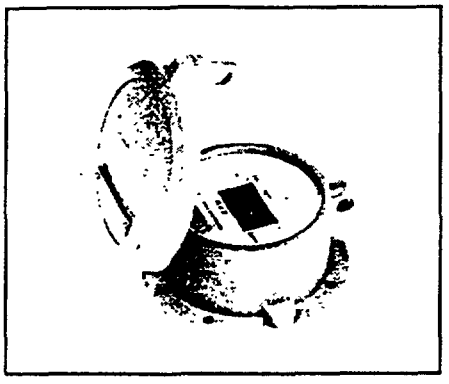
Printed in USA

NEW ! - *FROM WATER SPECIALTIES*

ELECTRONIC PROPELLER & TURBINE METERS

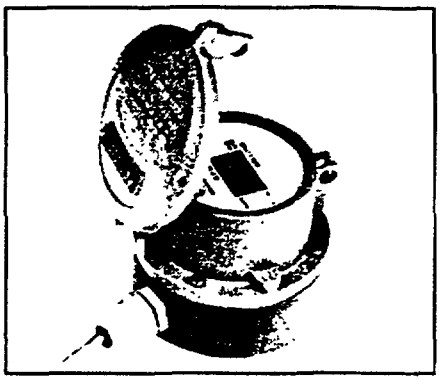
After extensive development, we are pleased to introduce these innovative products.

MODEL CN-08 DIGITAL INDICATOR-TOTALIZER & MODEL TR-28 ELECTRONIC TRANSMITTER



Model CN-08
Digital Indicator-Totalizer

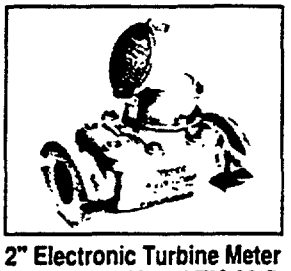
Model CN-08 and **Model TR-28** are available on propeller and turbine meters. The Digital Indicator-Totalizer is electronically driven by a sensor which is magnetically coupled to the propeller or rotor magnet. The propeller (in the electronic propeller meter) or the rotor (in the electronic turbine meter) are the only moving parts in the new electronic meters with **Model CN-08** or **TR-28** Digital Indicator-Totalizers. This solid state design offers extended life.



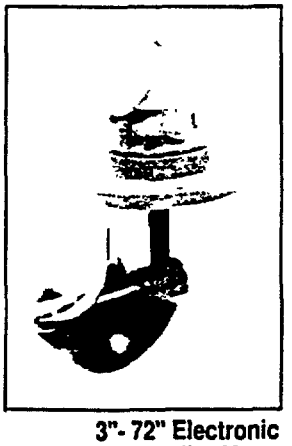
Model TR-28
Indicator-Totalizer Transmitter

Model TR-28 Digital Indicator-Totalizer transmitters provide a 4-20 mA output for Water Specialties recorders or SCADA equipment. The Model **TR-28** is loop powered (24 VDC) by the recorder or auxiliary power supply.

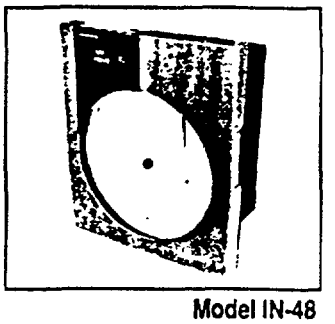
Model CN-08 and **TR-28** are excellent for vertical applications. Remote mounting, up to 50 feet away, is very simple with our accessory kit, excellent for pit or confined space applications. Conversion of a standard propeller meter to an electronic meter can be done in the field. Exchange meter heads for turbine meters are available. Field calibration is possible by using **Water Specialties** Model CN-12 programmer but must be tied into a DOS compatible computer. Resetting the totalizer to zero is a one minute job using **Water Specialties** Model CN-14.



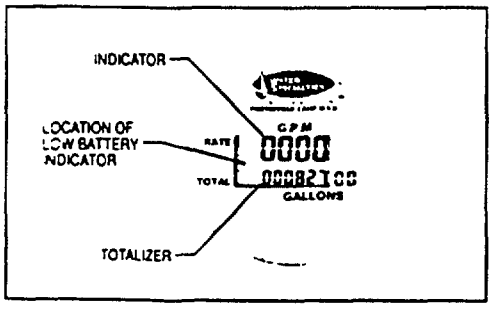
2" Electronic Turbine Meter
Model TM-02-D



3"- 72" Electronic
Propeller Meter
Model ML-04-D



Model IN-48
4-20 mA Input
12" Circular Chart Recorder
with Digital Indicator-Totalizer



Typical Digital Indicator-Totalizer

The **CN-08** display can be read in bright sunlight. The unit is potted into a solid capsule so no moisture can come in contact with the electronic components.

The battery is good for eight years or more and a low battery indicator light warns you one year prior to the battery going dead. **EPROM** Memory retains totalizer quantity and programming if the battery dies or during replacement.

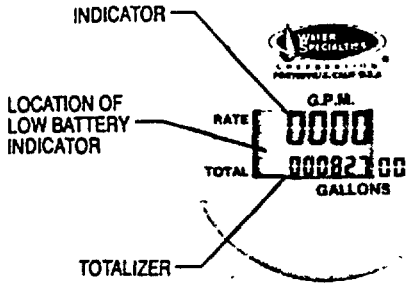
WATER SPECIALTIES CORPORATION
191 W. POPLAR AVE. • PORTERVILLE, CALIF. 93257
PHONE: 209-784-3544 • U.S.A. FAX: 800-800-8804
INTERNATIONAL FAX: 209-784-1787

EPTNF 1994

WATER SPECIALTIES CORPORATION

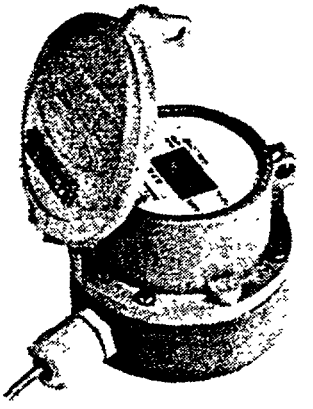
MODEL TR-28

INDICATOR - TOTALIZER - TRANSMITTER
SOLID STATE CONSTRUCTION
CURRENT OUTPUT - 2-WIRE CIRCUIT
DIGITAL DISPLAYS



TYPICAL
DIGITAL INDICATOR-TOTALIZER

MADC OUTPUT
4-20 mA @_____
White (+)
Black (-)
Shield to ground



DESCRIPTION

MODEL TR-28 INDICATOR-TOTALIZER-TRANSMITTERS provide a digital flow rate indication, a totalization of flow volume and a 4-20 mA current signal proportional to the rate of flow when mounted on our electronic turbine meters or electronic propeller meters. The unit features a digital indicator-totalizer and solid state construction transmitter.

INSTALLATION is normally made at the factory when the meter is assembled, but installation may be made in the field on to the electronic meter by removing the CN-08 and attaching the indicator-totalizer-transmitter and adaptor to the meter head. The unit is furnished complete with all screws and o-rings necessary for installation. An optional kit of adapters with up to 50 feet of cable is available to locate a TR-28 at a remote location.

CONSTRUCTION of the digital indicator-totalizer-transmitter features an o-ring sealed housing conforming to NEMA 4X standards which has a padlock hasp. The unit uses the latest solid state components, and is completely encapsulated to protect it from moisture. It is electronically driven by a sensor output directly from and is proportional to the rotation of the rotor or propeller.

DIGITAL INDICATOR-TOTALIZER has an EPROM memory so total flow will not be lost during battery change or should the 8-year battery not be changed after the 1-year low battery indicator warning comes on. The four digit indicator has .350" high numbers and six digit totalizer has .200" high numbers and is accurate at all points on the scale when operated between 0° and 160° F. The indicator dial can be furnished in GPM, CFS, MGD or any standard liquid measuring units with the choice of standard totalizer measuring units. The indicator-totalizer will continue to function even if the 24 VDC power supply needed for the transmitter output should be shut off. The totalizer can be reset to zero in the field by using Water Specialities Model CN-14. The unit does not have switches, jumpers or buttons, thereby preventing unauthorized personnel from adjusting the readings or resetting the totalizer to zero. However, the unit can be recalibrated by using Water Specialties Model CN-12 programmer. The unit uses the most up to date solid state components and is completely encapsulated to protect it from moisture. It is then installed in an o-ring sealed bonnet with padlock hasp.

TRANSMITTER uses the same sensor output. The standard 4-20 mA current output gives 4 mA output at zero flow and 20 mA output at maximum scale range: A 24 VDC power supply needs to be used in series with the mA output and the instrument the transmitter is operating. The 4-20 mA will operate instruments with a total of 600 ohms resistance. A two lead shielded cable, four feet long is furnished with each transmitter.

O-RING SEALS are used at all points where seals are required, making the indicator-totalizer-transmitter completely immune to any of the corrosive effects of atmospheric moisture or the liquids measured by the meter assembly.

SPECIFICATIONS

ACCURACY	Totalizer - ± 0.1% of the pulse input. Rate - ± 0.25 % maximum, depending on range. Analog output - ± .27% maximum, depending on range.
TEMPERATURE RANGE	0° to 160° F. Consult factory for special construction for other temperatures.
POWER SUPPLY	24 VDC (as supplied by our power supply model IN-36-1, available separately) wired in series with mA output and instrument. Note: Max. current consumption of transmitter is 20 mA. Indicator-totalizer is self powered by 8 year life lithium battery that has low battery display.
FLOW RANGE	acceptable for each transmitter unit is the same as that for the meter to which the unit mounts.
MATERIALS	used in construction are chosen for their durability and immunity to the corrosive effects of atmospheric moisture and the liquids measured by the meter assembly.
OUTPUT SIGNAL	Current signal: 4-20 mA (with loop impedance of 150Ω to 600Ω. See chart on back), true two wire with external power supply. Based on using 24 VDC power supply and 22 gauge wire, the maximum recommended distance is 3,800 feet for the 4-20 mA output transmission. Reverse voltage polarity protection.
MEMORY CHIP	Low battery display comes on 1 year before battery dies and EPROM will maintain totalizer reading if 8 year battery is not changed by one year after low battery light first comes on.
OPTIONAL EQUIPMENT	Mounting brackets, with up to 50 feet of cable for remote installation, Model IN-36-1 24VDC power supply.
SHIPPING WEIGHT	4 pounds
ORDERING INFO	Must be specified by the customer and includes: Serial number of meter unit is to be mounted, Maximum scale range required for 4-20 mA output, Indicator scale and units, Totalizer dial units.

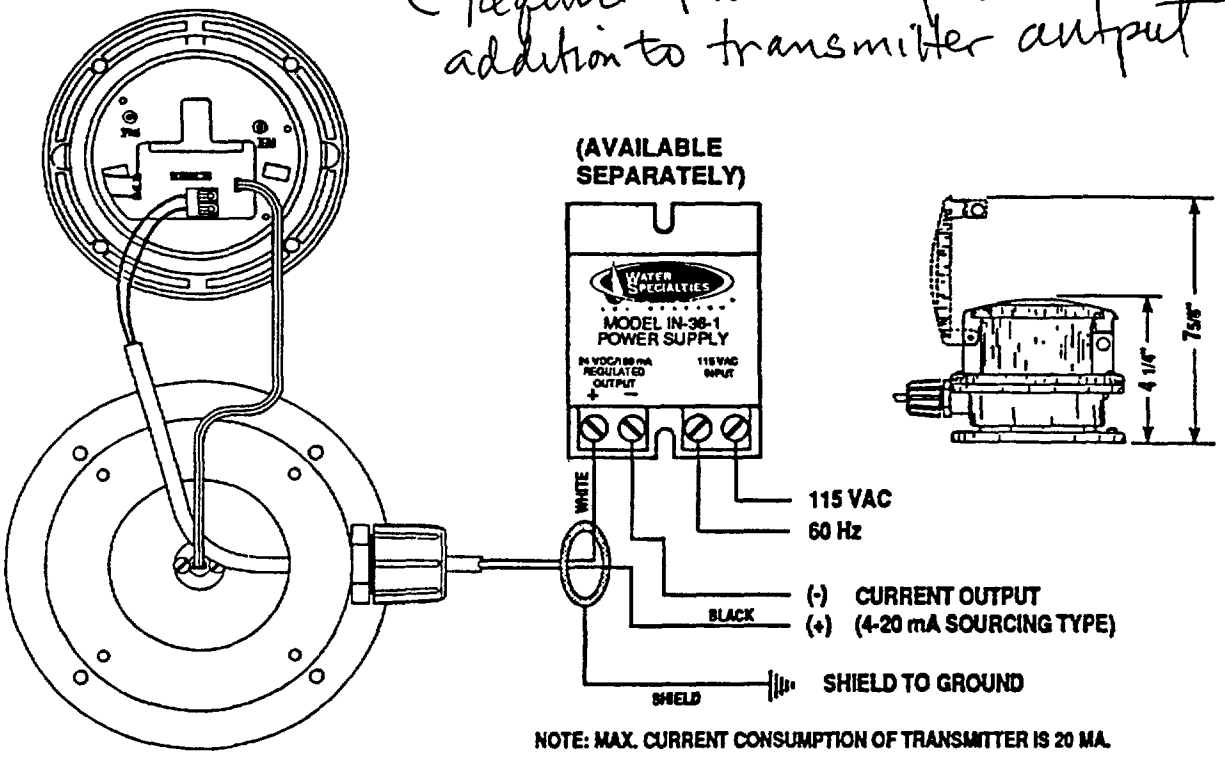
MODEL TR-28

INDICATOR - TOTALIZER - TRANSMITTER
SOLID STATE CONSTRUCTION
CURRENT OUTPUT - 2-WIRE CIRCUIT
DIGITAL DISPLAY

2 WIRE CIRCUIT CONNECTION
(STANDARD TRANSMITTER SUPPLIED WITHOUT PULSE OUTPUT)

require Pulse Output in addition to transmitter output

TR-28 BOTTOM VIEW



ADAPTER BASE

NOTE: MAX. CURRENT CONSUMPTION OF TRANSMITTER IS 20 MA.

Power Supply	Power supply voltage for loop	Maximum resistance of instruments in loop
Variable	15.0VDC	150Ω
Variable	18.0VDC	300Ω
Variable	21.0VDC	450Ω
IN-36-1(24V)	24.0VDC	600Ω
Variable	27.0VDC	750Ω
Variable	30.0VDC	900Ω

WIRE SIZE INFORMATION:
DISTANCE OF COMMUNICATION LINE FROM TRANSMITTER TO THE DEVICE THE 4-20 mA WILL OPERATE DEPENDS ON THE LOOP RESISTANCE, THE WIRE SIZE AND THE POWER SUPPLY.

BASED ON 24 VDC POWER SUPPLY AND 22 GAUGE WIRE, WE RECOMMEND A MAXIMUM LOOP OF 3,800 FEET.

WATER SPECIALTIES CORPORATION

PORTERVILLE, CALIFORNIA 93257 U.S.A.

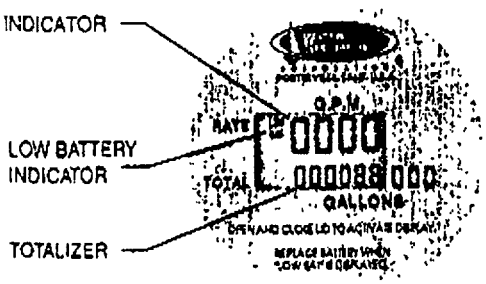
PHONE 209-784-3544
U.S.A. FAX 800-800-8804
INTERNATIONAL FAX 209-784-1787

AUTHORIZED DISTRIBUTOR:

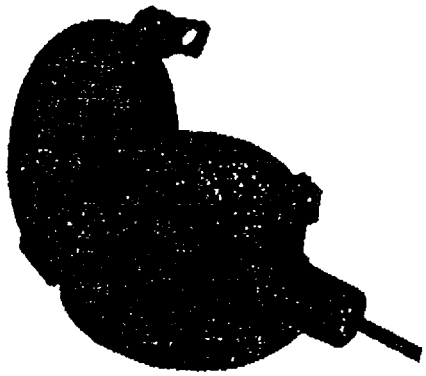
WATER SPECIALTIES CORPORATION

MODEL TR-29

INDICATOR - TOTALIZER - TRANSMITTER
SOLID STATE CONSTRUCTION
ONE PULSE PER TOTALIZER COUNT
DIGITAL DISPLAYS



TYPICAL
DIGITAL INDICATOR-TOTALIZER



DESCRIPTION

MODEL TR-29 INDICATOR-TOTALIZER-TRANSMITTERS provide a digital flow rate indication, a total zation of flow volume and one pulse output for each count of the totalizer when mounted on our electronic turbine meters or electronic propeller meters. The unit features a digital indicator-totalizer and solid state construction transmitter.

INSTALLATION is normally made at the factory when the meter is assembled, but installation may be made in the field on to the electronic meter by removing the CN-08 and attaching the indicator-totalizer transmitter and adaptor to the meter head. The unit is furnished complete with all screws and o-rings necessary for installation. An optional kit of adapters with up to 50 feet of cable is available to locate a TR-29 at a remote location.

CONSTRUCTION of the digital indicator totalizer-transmitter features an o-ring sealed housing conforming to NEMA 4X standards which has a padlock hasp. The unit uses the latest solid state components, and is completely encapsulated to protect it from moisture. It is electronically driven by a sensor output directly from and is proportional to the rotation of the rotor or propeller.

DIGITAL INDICATOR-TOTALIZER has an EPROM memory so total flow will not be lost during battery change or should the 8 year battery not be changed after the one year low battery indicator warning comes on. The four digit indicator has .350" high numbers and six digit totalizer has .200" high numbers and is accurate at all points on the scale when operated between 0° and 160° F. The indicator dial can be furnished in GPM, CFS, MGD or any standard liquid measuring units with the choice of standard totalizer measuring units. The totalizer can be reset to zero in the field by using Water Specialties Model CN-14. The unit does not have switches, jumpers or buttons, thereby preventing unauthorized personnel from adjusting the readings or resetting the totalizer to zero. However, the unit can be recalibrated by using Water Specialties Model CN-12 programmer. The unit uses the most up to date solid state components and is completely encapsulated to protect it from moisture. It is then installed in an o-ring sealed bonnet with padlock hasp.

TRANSMITTER is driven by the same sensor as the indicator-totalizer output. The standard pulse output is 12 volts, 50 mA. A two load shielded cable, four feet long is furnished with each transmitter.

O-RING SEALS are used at all points where seals are required, making the indicator-totalizer-transmitter completely immune to any of the corrosive effects of atmospheric moisture or the liquids measured by the meter assembly.

SPECIFICATIONS

ACCURACY	Totalizer - ± 0.1% of the pulse input. Rate - ± 0.25 % maximum, depending on range. Pulse output - ± 0.1%
TEMPERATURE RANGE	0° to 160° F. Consult factory for special construction for other temperatures.
POWER SUPPLY	Indicator-totalizer is self powered by 8 year life lithium battery that has low battery display.
FLOW RANGE	acceptable for each transmitter unit is the same as that for the meter to which the unit mounts.
MATERIALS	used in construction are chosen for their durability and immunity to the corrosive effects of atmospheric moisture and the liquids measured by the meter assembly.
OUTPUT SIGNAL	Pulse Rate - One pulse per totalizer digital count.
PULSE RATING	Maximum standoff voltage - 60 volts Maximum sink current - 50 mA Maximum voltage at 50 mA - 1.2 volts Minimum pulse output time - 50 ms Reverse polarity protected Open collector output
MEMORY CHIP	Low battery display comes on 1 year before battery dies and EPROM will maintain totalizer reading if the 8-year battery is not changed after the one year low battery indicator warning light comes on
OPTIONAL EQUIPMENT	Mounting brackets, with up to 50 feet of cable for remote installation.
SHIPPING WEIGHT	4 pounds.
ORDERING INFO	Must be specified by the customer and includes: Serial number of meter unit is to be mounted, Indicator scale and units, Totalizer dial units

Ductile

CONBRACO

SERIES 40-200

SPECIFICATIONS

GENERAL SPECIFICATIONS

The backflow preventer shall be a Reduced Pressure Principle and shall include a tightly closing resilient-seated gate valve on each end of the body. The assembly shall be fitted with four (4) properly located resilient-seated test cocks.

The assembly shall have two (2) independent and internally loaded check valves and a pressure differential relief valve located between the check valves.

The backflow preventer shall be suitable for **supply pressure up to 175 psi and water temperatures from 33 to 140° F.**

The backflow preventer shall meet the requirements of the following standards: **USC's FCCC & HR Manual, Sec. 10, ASSE 1013, AWWA C-511, IAPMO, CSA B64.4, UL and FM.**

CONBRACO SPECIFICATIONS

A Reduced Pressure Principle backflow preventer shall protect against backflow by either back-pressure or back-siphonage from a cross-connection between potable water system and substances that are non-health and health hazards.

It shall consist of two (2) mechanically independent, spring loaded, poppet type check valves and a hydraulically dependent differential pressure relief valve set in an epoxy-coated (FDA Approved) ductile iron body. The assembly shall include four (4) quarter-turn, full-port, resilient-seated test cocks and two (2) resilient-wedge gate valves.

The seat of each check valve and the relief valve shall be replaceable. The loading of each check valve poppet assembly shall be accomplished by a stainless steel compression spring retained in position by a ductile iron cover bolted to the body.

The differential pressure relief valve shall be located between and below the check valves and the sensing passage shall be casted internally into the body. The relief valve shall be spring loaded to open and diaphragm actuated to remain in the closed position by means of a differential pressure.

All parts shall be made of corrosion resistant materials and shall be **100% made in the USA.**

The backflow preventer shall be suitable for **supply pressure up to 175 psi and water temperatures from 33 to 140° F.**

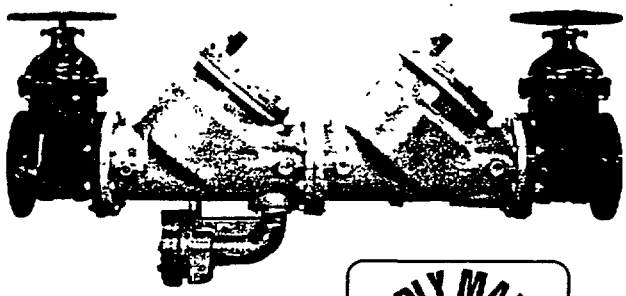
The backflow preventer shall be listed or approved under the following standards: **USC's FCCC & HR Manual, Sec. 10, ASSE 1013, AWWA C-511, IAPMO, CSA B64.4, UL and FM.**

The manufacturing facility shall be **ISO 9001 REGISTERED.**

The backflow preventer shall be manufactured by **CONBRACO INDUSTRIES, INC.,** Matthews, North Carolina.

Reduced Pressure Principle

Sizes 6" – 8" – 10"



PROUDLY MADE IN USA

ISO 9001 REGISTERED

FEATURES

- Maximum Protection against Backpressure/ Backsiphonage
- Removal Bronze Seats
- Replaceable Discs
- Internal Sensing Passage
- Designed For Easy Maintenance
- Low Head Loss
- Economical
- Corrosion Resistant
- Maximum Working Pressure 175 PSI
- Operating Temperature Range 33-140° F

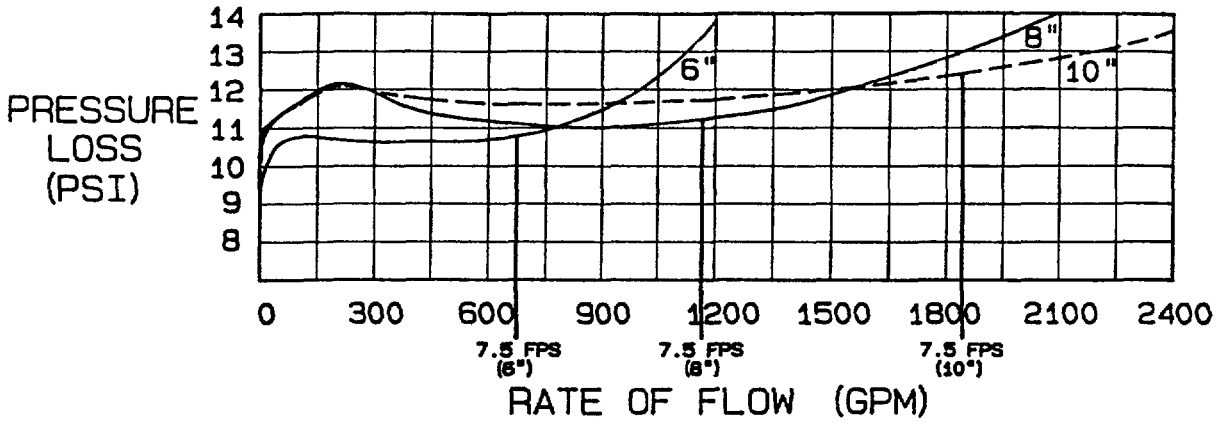
APPROVALS

The Series 40-200 is approved under the following standards: USC's FCCC & HR Manual, Sec. 10, ASSE 1013, AWWA C-511, IAPMO, CSA B64.4, UL Classified and FM.

UL, FM approved backflow preventers must include OS&Y gate valves.

SPEC 20C-20G

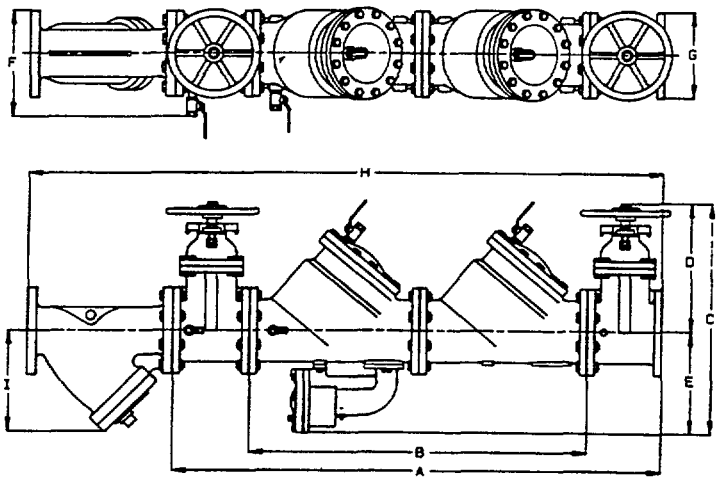
FLOW CURVES



DIMENSIONS (in.) – WEIGHTS (lbs.)

Body Size	6"	8"	10"
A	63	75	88 1/4
B	42	52	62 1/16
C NRS	28 1/4	32 15/16	39 7/8
C OS&Y (OPEN)	41 5/8	50 1/2	63 3/4
D NRS	16 3/4	20 3/16	24 1/8
D OS&Y (OPEN)	30 1/8	37 3/4	48
E	11 1/2	12 3/4	15 3/4
F	14 5/8	16 3/4	19 1/4
G	11	13 1/2	16
H	84 1/16	97 9/16	114 13/16
I	16 1/4	17	20 1/4
Test Cocks	3/4x3/4 NPT	3/4x3/4 NPT	3/4x3/4 NPT
Net Wgt. (Less Gate Valves)	430	715	1443
Net. Wgt (with NRS Valves)	736	1155	2148
Net. Wgt. (with OS&Y Valves)	754	1210	2286
Shipping Wgt (Less Gate Valves)	528	885	1613
Shipping Wgt. (w/NRS Valves)	834	1325	2318
Shipping Wgt. (w/OS&Y Valves)	852	1380	2456

NOTE: Weights do not include strainer.
Strainer shipped loose.



MATERIALS

1. Body	Epoxy Coated (FDA Approved) Ductile Iron
2. Springs	Stainless Steel
3. Seats	Bronze
4. C.V. Discs	EPDM
5. R.V. Disc	Silicone
6. R.V. Diaphragm	Buna N and Nylon
7. R.V. Body	Bronze – For 6" only
8. R.V. Body	Epoxy Coated (FDA Approved) Ductile Iron – For 8" & 10" only
9. Fasteners	Stainless Steel

ORDERING NUMBERS

6"– 40-20C
8"– 40-20E
10"–40-20G

SUFFIX NUMBERS
–01 less gate valves
–02 with NRS gate valves
–03 with OS&Y gate valves

BACKFLOW PRODUCTS DIVISION
Conbraco Industries, Inc. P.O. Box 247 Matthews, N.C. 28106 (704) 847-9191 FAX (704)841-6020-USA-